INT. J. BIOL. BIOTECH., 13 (2): 329-333, 2016.

TO EVALUATE THE EFFECT OF ELECTRICAL STIMULATION IN BELL`S PALSY

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ABSTARCTS

This experimental study was conducted in Aga Khan University AKU to evaluate the therapeutic effects of electrical stimulation in the patients of Bell's palsy. A sample size of (n=60) subjects were selected randomly, which were equally divided into two groups: 1) experimental group and 2) control group. The therapeutic measures which were taken for experimental group were galvanic stimulation, massage and facial expressional exercises while massage and facial expressional exercises were given to subjects in control group. Patients were weekly assessed according to ordinal scale (House Brackmann Facial Nerve Grading System). In experimental group, 14 patients were improved 60%, 11 patients were improved 40%, 3 patients improved 20% & 2 patients Improved 80% while in control group, 22 patients were improved 40%, 3 patients were improved 60% & 5 patients were improved 20%. The result shows significant level at $p < 0.05$. Data was analyzed by applying the Mann Whitney U test and result was found to be significant at level of $p < 0.05$. The results supported the hypothesis that electrical stimulation is effective in recovery of Bell 's palsy.

Key Words: Bell`s Palsy, electrical stimulation, galvanic current.

INTRODUCTION

Bell's palsy involves paralysis of the facial nerve (cranial nerve VII) and usually occurs where the nerve emerges from the stylomastoid foramen (Magee, 2009). The bones that form the front of the skull, the superior orbital margins and the area above them are formed by the frontal bone, which contains the frontal air sinuses (Snell, 2000). Facial nerve is seventh cranial nerve, the motor nucleus of facial nerve lies in pons, its fibers emerge from lateral pontomedullary junction then along with VIII nerve and nervus intermedius enter the internal acoustic meatus, then the facial canal of the temporal bone (Saeed and Al-Ghandi, 1997). Facial nerve palsy is also called facial nerve paralysis (Danish 2006). The common causes of bell's palsy included are trauma, middle ear infection, herpes zoster, tumor and idiopathic (Danish, 2006). It is common, acute, isolated facial nerve paralysis believed to be due to viral (often herpes simplex) infection that results in swelling of the nerve within facial canal in petrous temporal bone(Danish, 2006). This swelling may be responsible for initial loss of nerve impulse conduction leading facial paralysis. Bell's palsy is more common in pregnant women and in diabetics. Impairment of the taste on the anterior 2/3 of the tongue due to involvement of chorda tympani fibers in some patients. Marked unilateral facial weakness. Droopy eyelid, dry eye, or excessive tears (Mcphee and Lawrence, 2008). Tasorrhaphy (suturing of upper and lower lid) may be required (Blackbourne, 2006). Anastomosis of the lingual nerve to the facial nerve is sometime indicated if there is no recovery after a year (Blackbourne, 2006). Regarding treatment; drink all liquids through a straw. It does help the muscles around the mouth. Smile without showing teeth, then smile showing teeth (Brach *et al.*, 1999). Patients can apply electrical stimulation with the help of a microcomputer or a micro controlled device (Hoe *et al.*, 1993). EMS can be use because the body is an electrically charged as a matter of physiology (Kidd and Oldhan, 1988).A faradic-type current is a short duration interrupted direct current with pulse duration of less than 10 ms and a frequency of 50-100 Hz (hertz). The faradic-type current is used for stimulating normal (innervated) muscles (Clayton, 2001).

Literature Review

Mosforth and Taverner (1999) emphasized on the effect of electrical stimulation in patients with bell's palsy. Around 83 patients of bell's palsy were randomly selected in this study after confirmed diagnosis by clinical examination . Control group was treated daily by facial massage (n=40) while the experimental was treated with massage, exercises and electrical stimulation (interrupted galvanic) daily. In this study electrical stimulation was applied to a session of daily massage which resulted in neither harm nor improvement.

Taverner *et al.* (1967) conducted research and noted a progress in patients with bell's palsy caused by unknown reason and explained the methods to decrease in the incidence rate of denervation. They recruited 381 patients with not more than 5 days duration for the study from which 191 females and 191 males with mean aged of 42.4 years and 40.1 years respectively. After the study they concluded overall incidence of denervation was reduced by 2/3 and severe denervation by 90%.

Sherbini (1971) Performed research on management and prognosis of bilateral (both sides) bell's palsy. They studied around 10 patients with age ranges between 5 and 62 years, out of which (07) seven patients suffered from proportional facial palsy and rest o the three had asymmetrical or uneven bell's palsy. Massage and facial exercises were started at once for a period of two months. An increase level of improvement was distinguished in patients of age below 40 years. Along with it 08 cases of bilateral facial palsy improved simultaneously and the other two patients (no: 01 and 08 only recovered the right side.

Farragher *et al* (1987) emphasized that the motor recovery in muscles affected by bell's palsy were enhance by eutrophic electrical stimulation.In this study (n=40) patients were distributed in two groups (n=20 each) in electrical stimulation group and in control group .This study showed that chronic patients may get advantage from eutrophic electrical stimulation with addition to facial massage and exercises.

Saeed and Al Ghamdi (1997) emphasized on idiopathic Bell's palsy in the south west region of Saudi Arabia (Asir region). The main associated factor was exposure to cold, 312 patients had single unilateral attacks, 6 had ipsilateral recurrent attacks while 3 had contralateral recurrent attacks and no cases of bilaterally attacks were observed.

Poricari *et al.* (2002) emphasized on effect of electrical muscle stimulation on body composition, muscle strength and physical appearance. Twenty seven college-aged volunteers were assigned to either an EMS (n 5 16) or control group (n 5 11). The EMS group underwent stimulation 3 times per week following the manufacturer's recommendations, whereas the control group underwent concurrent sham stimulation sessions. The claims relative to the effectiveness of EMS for the apparently healthy individual are not supported by the findings of this study.

MATERIALS AND METHODS

This study was done to evaluate the efficacy of electrical stimulation in Bell's palsy. Equal probability sampling technique was implemented and patients were recruited from physiotherapy out patients department of Baqai university hospital, Nazimabad and Jinnah Post Graduate Medical Center and National Medical Center Karachi. The participants were bell's palsy patients with age above 12 (male and female both).Patients with upper motor neuron (UMN) lesion were not included. Patients <12 years also were not selected as subjects. The participants of this experimental study were assessed weekly according to ordinal scale (House Brackmann Facial Nerve Grading System). The subjects were distributed into two groups; experimental group and control group. Total subjects (n=60) were randomly selected and equally allocated in a group of (n=30) each. The treatment interventions included as galvanic stimulation, massage and facial exercises were given to subjects in experimental group whereas (massage and facial expressional exercises) were given to subjects in control group. The period of study was 1 year (From 1 July 2010 to 1 June 2011). Patients were reassessed weekly. Electrical modality used for treatment purpose was DL2 or portable electrical stimulator for galvanic stimulation.

The data were analyzed by non-parametric test (Mann Whitney U test). Data is taken from difference between 1st session and 29th session. Data is calculated by formula and data is presented in Table 1.

RESULTS

In this study 41 patients were males and 19 patients were females. Gender split of the sample 68% are males and 32% are females. Bell's palsy was found more common in males may be due to more exposure to the environment as compared to females.

Data was analyzed by applying the Mann Whitney U test. The result is U=257.5 which is significant at level of 2%, $p < 0.05$. This shows that electrical stimulation accelerate the improvement. As significant difference was noticed between experimental and control groups. In experimental group 14 patients showed 60% improvement, 11 patients showed 40% improvement, 3 patients showed 20% improvement and 2 patients showed 80% improvement (Table 2). Whereas control group showed less improvement compared to experimental group. In control group 22 patients showed 40% improvement, 3 patients showed 60% improvement and 5 patients showed 20% improvement (Table 2)

Table 1. Showing the statistics of different interventions.

Subjects	**Treatment(EMS+ Eercise+massage)**	**Rank**	**Subjects**	**Control (exercise massage)**	**Rank**
1	6	50	1	2	4.5
2	4	25	2	4	25
3	4	25	3	4	25
4	2	4.5	4	4	25
5	4	25	5	4	25
6	6	50	6	4	25
7	4	25	7	4	25
8	4	25	8	4	25
9	6	50	9	4	25
10	6	50	10	6	50
11	4	25	11	4	25
12	2	4.5	12	4	25
13	6	50	13	4	25
14	2	4.5	14	4	25
15	4	25	15	4	25
16	6	50	16	6	50
17	4	25	17	4	25
18	6	50	18	4	25
19	6	50	19	4	25
20	6	50	20	4	25
21	8	59.5	21	2	4.5
22	6	50	22	2	4.5
23	4	25	23	4	25
24	6	50	24	4	25
25	6	50	25	4	25
26	4	25	26	4	25
27	6	50	27	6	50
28	8	59.5	28	2	4.5
29	6	50	29	4	25
30	4	25	30	2	4.5
N1 = 30		∑rank= 1107.5	N2 = 30		∑rank= 747.5

Table 2. Data showing improvement in control and experimental groups.

Experimental Group		Control Groups	
Number of Patients	Improvement %	Number of Patients	Improvement %
14	60	22	40
11	40	03	60
03	20	05	20
02	80	-	-

DISCUSSION

This study supported the hypothesis that electrical stimulation accelerates the improvement or recovery of bell's palsy significantly. Treatment protocol given to subjects in experimental group was included as galvanic electric stimulation, massage and facial exercises, whereas treatment given to subjects in control group was massage and facial expressional exercises. Patients were weekly assessed according to ordinal scale (House Brackmann Facial Nerve Grading System). Difference of improvement was taken between 1st session and 29th session in data analysis. The outcome measure of the study was evaluated by the application of Mann Whitney U test, which showed significant level of 2%, $p < 0.05$ and value as U=257.5. As significant difference was noticed between experimental and control group which shows that electrical stimulation augment the recovery process. In experimental group 14 patients were improved 60%, 11 patients were improved 40%, 3 patients improved 20% & 2 patients Improved 80%. In control group 22 patients were improved 40%, 3 patients were improved 60% & 5 patients were improved 20%In this study 68% participants were males and 32% were females. Males participants with Bell's palsy were found more may be because males more exposed to the extreme environmental conditions as compared to females. Jalisi *et al.* (1992) revealed that bell's palsy shows no gender predilection. Female teenagers suffer in large number. It is familial in 10% of the patients. Diabetics and pregnant are predisposed. There was some limitation of the study such as availability of time and monetary resources, co-ordination with concerned authorities. Teixeira e*t al.* (2011) selected randomised or quasi-randomised controlled trials involving the physical therapy also concluded that electrical stimulation is beneficial in bell's palsy and has no harmful effects. There are very few evidence that tailored facial exercises can help to improve facial function, mainly for people with moderate paralysis and chronic cases. The suggested effects of tailored facial exercises need to be confirmed with good quality randomized controlled trials. Buttress (1997), a research Physiotherapist, completed three parts questions in facial nerve palsy. Firstly facial exercises better than electrical stimulation at improving time to function/facial symmetry. There are several evidences to justify the use of electrical stimulation in patients with long-term Bells' Palsy, although the study could have been more accurate.

Conclusion

This study shows that electrical stimulation speed up the improvement or recovery, hence it supports the experimental hypothesis and result was found at significant level of 2%, $p < 0.02$, that is significant difference was noticed between experimental and control group.

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(*Accepted for publication February 2016*)